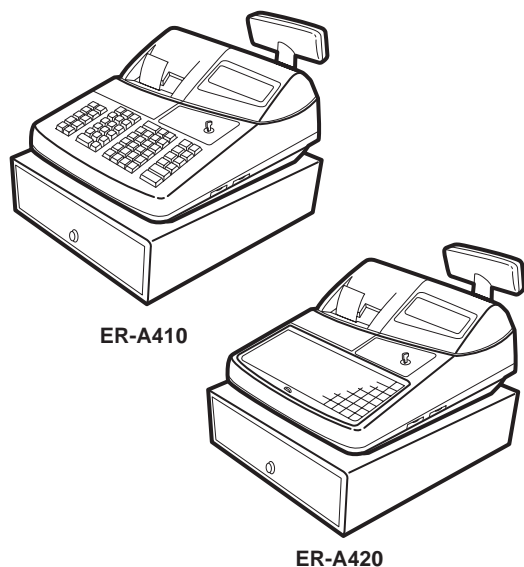


SHARP SERVICE MANUAL

CODE : 00ZERA410VSME



ELECTRONIC CASH REGISTER

ER-A410 MODEL ER-A420

SRV KEY : LKGIM7113RCZZ
PRINTER : PR-45M II
(V version)

CONTENTS

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PARTS GUIDE	

Parts marked with "△" are important for maintaining the safety of the set. Be sure to replace these parts with specified ones for maintaining the safety and performance of the set.

CAUTION

RISK OF EXPLOSION IF BATTERY IS REPLACED
BY AN INCORRECT TYPE.

DISPOSE OF USED BATTERIES ACCORDING
TO THE INSTRUCTIONS.

IF THE MODE SW IS SET TO THE SRV' POSITION
WHEN THE POWER IS OFF,
THE MACHINE WILL NOT OPERATE PROPERLY EVEN T
HOUGH THE POWER IS TURNED ON.

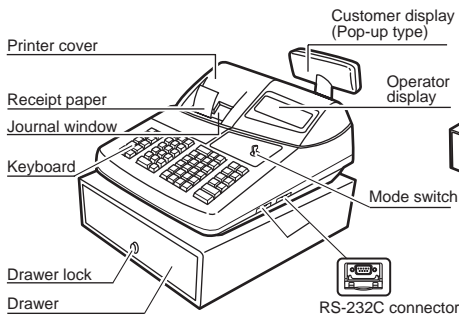
DO NOT SET THE MODE SW TO THE SRV' POSITION
WHEN THE POWER IS OFF.

CHAPTER 1. SPECIFICATIONS

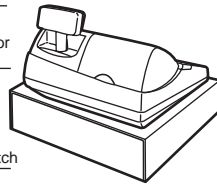
1. APPEARANCE

ER-A410

■Front view

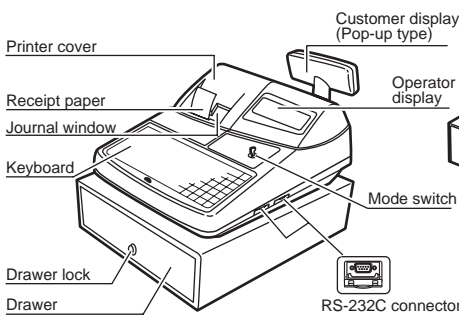


■Rear view

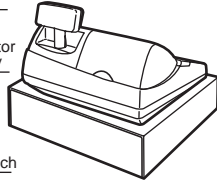


ER-A420

■Front view



■Rear view



2. RATING

	ER-A410/420
Weight	ER-A410: 12.2kg ER-A420: 12.1kg
Dimensions	355 (W) x 424 (D) x 305 (H) mm
Power source	220~230V (±10%), 50/60Hz 230~240V (±10%), 50Hz
Power consumption	Stand-by 11W, Operating 49W (max.)
Working temperature	0°C~40°C (32°F to 104°F)

3. KEYBOARD

3-1. KEYBOARD LAYOUT

ER-A410

Type	Normal keyboard
Key stroke	3.5 ± 0.5 mm
Key pitch	19 (W) x 19 (H) mm

ER-A420

Type	Flat key
Key stroke	1.1 ± 0.2 mm
Key pitch	18 (W) x 15 (H) mm

3-2. KEY LAYOUT

ER-A410 KEYLAYOUT

		NS	#	CASH #			PLU/SUB	AMT	DEPT #			AUTO	VAT	
↑ RECEIPT	↑ JOURNAL	⊗	•	CL			5	10	15	20			EX1	EX2
RCPT	DIFFER ST	7	8	9			4	9	14	19			CR1	CR2
RA	PO	4	5	6			3	8	13	18			CH1	CH2
⊖	%	1	2	3			2	7	12	17			ST	
∞	RF	0		00			1	6	11	16			TL	

Note: All the keys but the receipt paper feed and journal paper feed keys can be re-positioned.

If you want to change the layout, consult your dealer.

■Key names

↑ RECEIPT	Receipt paper feed key
↑ JOURNAL	Journal paper feed key
0 ~ 9, 00	Numeric keys
•	Decimal point key
⊗	Multiplication key
CL	Clear key
1 ~ 20	Department keys
PLU/SUB	Price lookup/subdepartment key
AMT	Amount entry key
VAT	Value added tax key
CASH #	Cashier code entry key
⊖	Discount key
%	Percent key
EX1, EX2	Foreign currency exchange 1 and 2 keys
CR1, CR2	Credit 1 and 2 keys
CH1, CH2	Cheque 1 and 2 keys
ST	Subtotal key
TL	Total (cash total) key
∞	Void key
RF	Refund key
RA	Received-on-account key
PO	Paid-out key
DEPT #	Department code entry key
#	Non-add code key
NS	No-sale key
DIFFER ST	Difference subtotal key
RCPT	Receipt print key
AUTO	Automatic sequencing key

■ Optional keys

SLIP	Slip print key
%2 ~ %4	Percent 2 through 4 keys
AUTO 2 ~ AUTO 5	Automatic sequencing 2 through 5 keys
CA2	Cash total 2 key
CR3, CR4	Credit 3 and 4 keys
RA2	Received-on-account 2 key
PO2	Paid-out 2 key
VAT SHIFT	Value added tax shift key
VP	Validation print key
CLERK #	Clerk code entry key
GC COPY	Guest check copy key
PBLU	Previous balance lookup key
NBAL	New balance key
FINAL	Final key
DEPO (+)	Deposit entry key
DEPO (-)	Deposit refund key
GC RCPT	Guest check receipt key
CHK PRINT	Check print key
1/2	Half penny key
L1 ~ L3	PLU level shift 1 through 3 keys
PRICE SHIFT	Price level shift key
⊖2 ~ ⊖4	Discount 2 through 4 keys
CH3, CH4	Cheque 3 and 4 keys
EX3, EX4	Foreign currency exchange 3 and 4 keys
000	Triple zero entry key

Note: The department and direct PLU keys can be extended, if you require extension of the department or direct PLU keys, please contact your dealer.

ER-A420 KEYLAYOUT

↑ RECEIPT	↑ JOURNAL	2	4	6	L3	PRICE SHIFT	7	14	21	28	35	42	49	56	63	70
RCPT	GC COPY	1	3	5	L2	DEPT #	6	13	20	27	34	41	48	55	62	69
CASH #	VAT	⊗	•	CL	L1	CR2	5	12	19	26	33	40	47	54	61	68
#	AUTO	7	8	9	AMT	CR1	4	11	18	25	32	39	46	53	60	67
⊖	%	4	5	6	PLU/SUB	CH	3	10	17	24	31	38	45	52	59	66
PO	RA	1	2	3	NS	EX	2	9	16	23	30	37	44	51	58	65
∞	RF	0	00	000	ST	TL	1	8	15	22	29	36	43	50	57	64

Note: All the keys but the receipt paper feed and journal paper feed keys can be re-positioned.
If you want to change the layout, consult your dealer.

■ Key names

↑ RECEIPT	Receipt paper feed key
↑ JOURNAL	Journal paper feed key
0 ~ 9, 00, 000	Numeric keys
•	Decimal point key
⊗	Multiplication key
CL	Clear key
1 ~ 6	Department keys
PLU/SUB	Price lookup/subdepartment key

AMT	Amount entry key
VAT	Value added tax key
CASH #	Cashier code entry key
⊖	Discount key
DEPT #	Department code entry key
%	Percent key
L1 ~ L3	PLU level shift 1 through 3 keys
CR1, CR2	Credit 1 and 2 keys
CH	Cheque key
ST	Subtotal key
TL	Total (cash total) key
∞	Void key
RF	Refund key
RA	Received-on-account key
PO	Paid-out key
GC COPY	Guest check copy key
EX	Foreign currency exchange key
PRICE SHIFT	Price level shift key
NS	No-sale key
#	Non-add code key
RCPT	Receipt print key
AUTO	Automatic sequencing key
1 ~ 70	Direct price lookup keys

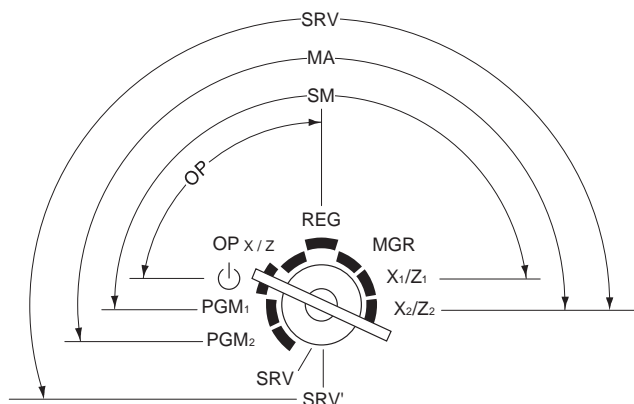
■ Optional keys

SLIP	Slip print key
%2 ~ %4	Percent 2 through 4 keys
AUTO 2 ~ AUTO 5	Automatic sequencing 2 through 5 keys
CA2	Cash total 2 key
CR3, CR4	Credit 3 and 4 keys
RA2	Received-on-account 2 key
PO2	Paid-out 2 key
VAT SHIFT	Value added tax shift key
DIFFER ST	Difference subtotal key
CLERK #	Clerk code entry key
VP	Validation print key
PBLU	Previous balance lookup key
NBAL	New balance key
FINAL	Final key
DEPO (+)	Deposit entry key
DEPO (-)	Deposit refund key
GC RCPT	Guest check receipt key
CHK PRINT	Check print key
1/2	Half penny key
⊖2 ~ ⊖4	Discount 2 through 4 keys
CH2 ~ CH4	Cheque 2 through 4 keys
EX2 ~ EX4	Foreign currency exchange 2 through 4 keys

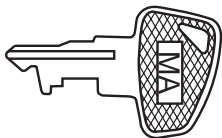
Note: The department and direct PLU keys can be extended, if you require extension of the department or direct PLU keys, please contact your dealer.

4. MODE SWITCH

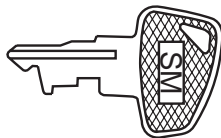
4-1. MODE SWITCH AND MODE KEYS



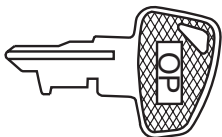
- Manager key (MA)



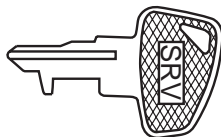
- Submanager key (SM)



- Operator key (OP)



- Service key (SRV)



The mode switch has these settings:

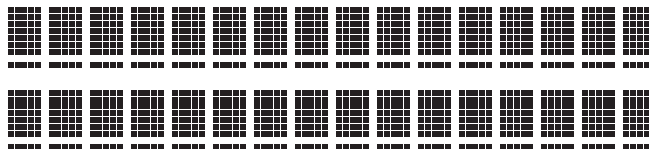
- ⏻ : This mode locks all register operations.
No change occurs to register data.
- OP X/Z:** This setting allows cashiers/clerks to take X or Z reports for their sales information. (This setting may be used only when your register has been programmed for "OP X/Z mode available" in the PGM2 mode.)
- REG:** For entering sales
- PGM1:** To program those items that need to be changed often: e.g., unit prices of departments, PLUs or EANs, and percentages
- PGM2:** To program all PGM1 items and those items that do not require frequent changes: e.g., date, time, or a variety of register functions
- MGR:** For manager's and submanager's entries
The manager can use this mode to make entries that are not permitted to be made by cashiers -for example, after-transaction voiding and override entry.
- X1/Z1:** To take the X/Z report for various daily totals
- X2/Z2:** To take the X/Z report for various periodic (weekly or monthly) consolidation

5. DISPLAY

5-1. OPERATOR DISPLAY

Display device: LCD
 Number of line: 2 line
 Number of positions: 16 positions
 Color of display: Yellow / Green
 Character font: 5 x 7 dot
 Character size: 4.84 (W) x 8.06 (H) mm

Layout:



5-2. CUSTOMER DISPLAY

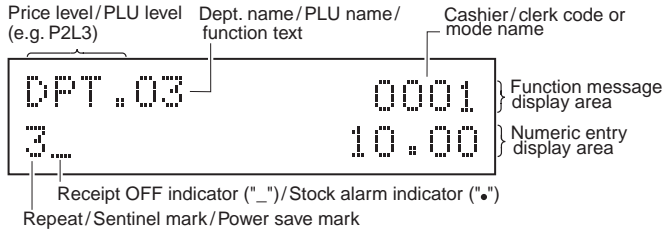
Display device: LED
 Number of line: 1 line
 Number of positions: 7 positions
 Color of display: Yellow / Green
 Style: Pop up type
 Character form: 7 segment + Dp
 Character size: 14.2mm (H) x 7.9mm (W)

Layout:



■Operator display

The operator display consists of a 2-line LCD dot-matrix display (16 characters/line).



- Cashier/clerk code or mode name

The mode you are in is displayed. When a cashier/clerk is assigned, the corresponding cashier/clerkcode is displayed in the REG or OP X/Z mode. For example, "0001" is displayed when cashier 0001 is assigned.

- Repeat

The number of repeats is displayed, starting at "2" and incremental with each repeat. When you have registered ten times, the display will show "0". (2 → 3.....9 → 0 → 1 → 2...)

- Sentinel mark

When the amount in the drawer reaches the amount you preprogrammed, the sentinel mark "X" is displayed to advice you to remove the money to a safe place.

- Power save mark

When the cash register goes into the power save mode, the power save mark (decimal point) is displayed.

- Stock alarm indicator

When the stock of the PLU which you entered is zero or negative, the alarm indicator (decimal point) is displayed.

- Function message display area

Item labels of departments and PLU/subdepartments and function texts you use, such as %1, (-) and CASH are displayed here. For the details of function texts.

When an amount is to be entered or entered, "AMOUNT" is displayed: When an amount is to be entered, - - - - - is displayed in the numeric entry display area with "AMOUNT". When a preset price has been set, the price is displayed in the numeric entry display area with "AMOUNT".

- Numeric entry display area

Numbers entered using numeric keys are displayed here.

Date and time display

Date and time appear on the display in the OP X/Z, REG, or MGR mode. In the REG or MGR mode, press the [#] key to display the date and time.

Error message

When an error occurs, the corresponding error message is displayed in the function message display area.

■Customer display (Pop-up type)



Power save mark (This mark appears only in the power save mode)

6. PRINTER

6-1. PRINTER

- Part number: PR-45M II (PR-45M compatible)
- NO. of station: 2 (Receipt and journal)
- Validation: No
- Printing system: Line thermal
- No. of dot: Receipt 288 dots
Journal 288 dots
- Dot pitch: Horizontal 0.125mm
Vertical 0.125mm
- Font: font A: 12 dots x 24 dots
font B: 9 dots x 24dots
- Printing capacity: Receipt max. 24 characters
Journal max. 24 characters
- Character size: 1.5mm (W) x 3.0mm (H) at 12 x 24 dots
1.125mm (W) x 3.0mm (H) at 9 x 24 dots
- Print pitch: Column distance 1.5mm at 12 dots
1.125mm at 9 dots
Row distance 3.75mm
- Print speed: Approximate 50mm/s
- Paper feed speed: Approximate 40mm/s (Manual feed)
- Reliability: Mechanism MCBF 5 million lines
- Paper end sensor: Set up (Receipt and journal)
- Cutter: Manual
- Near end sensor: No

Note : PR-45MII is minor change model of the PR-45M.

This printer is not set gear cover (GCOVH7146BHZZ) from PR-45M only.

6-2. PAPER

- Paper roll dimension: 44.5 ± 0.5mm in width
Max. 83mm in diameter
- Paper quality: (Journal/Receipt)
High-quality paper
paper thickness: 0.06 to 0.08mm

6-3. LOGO STAMP

- No

6-4. CUTTER

- Method: Manual

7. DRAWER

[OUTLINE]

- Standard equipment: Yes
- Max. number of additional drawers: 1
- The drawer consists of:
 - 1) Drawer box (outer case) and drawer
 - 2) Money case
 - 3) Lock (attached to the drawer)

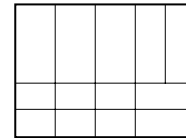
[SPECIFICATION]

7-1. DRAWER BOX AND DRAWER

Model name of the drawer box	SK420
Size	355 (W) x 424 (D) x 120 (H) mm
color	Gray 368
Material	Metal
Bell	—
Release lever	Standard equipment: situated at the bottom
Drawer open sensor	YES

7-2. MONEY CASE

Separation from the drawer	Allowed
Separation of the bill compartments from the coin compartments	Allowed
Bill separator	Disallowed
Number of compartments	5B/8C



5B/8C

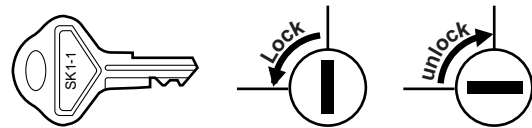
7-3. LOCK (LOCK KEY: LKGIM7331BHZZ)

- Location of the lock: Front
- Method of locking and unlocking:

To lock, insert the drawer lock key into the lock and turn it 90 degrees counter clockwise.

To unlock, insert the drawer lock key and turn it 90 degrees clockwise.

Key No: SK1-1



CHAPTER 2. OPTIONS

1. OPTIONS

NO	CLASSIFICATION	COMPONENT NAME	MODEL NAME	REMARK
1	Drawer	Remote drawer	ER-03DW	
			ER-04DW	
			ER-05DW	
			ER-06DW	
2	EFT function	EFT terminal I/F	ER-03EF	
3	Key kit	1 x 1 key top kit	ER-11KT7	
		1 x 2 key top kit	ER-12KT7	
		2 x 2 key top kit	ER-22KT7	
		1 x 1 dummy key kit	ER-11DK7G	
		5 x 1 dummy key kit	ER-51DK7G	

2. SERVICE OPTIONS

NO	NAME	PARTS CODE	PRICE RANK	REMARK
1	SRV key	LKGIM7113RCZZ	AK	
2	Water proof switch cover	GCÖVH2541BHZZ	AY	
3	Water proof keyboard cover	GCÖVH2541BHZA	BC	For ER-A410
4	Text preset key cover	GCÖVH2541BHSA	BD	For ER-A410
5	Blank sheet	PSHEK3008BHZZ	AL	For ER-A420

3. SUPPLIES

NO	NAME	PARTS CODE	PRICE RANK	DESCRIPTION
1	Thermal roll paper	TPAPR6645RC05	BA	5 ROLLS/PACK

4. SPECIAL SERVICE TOOLS

NO	NAME	PARTS CODE	PRICE RANK	DESCRIPTION
1	RS-232 Loop-back connector	UKOG-6705RCZZ	BU	

CHAPTER 3. MASTER RESET AND PROGRAM RESET

The SRV key is used for operating in the SRV mode.

MASTER RESET clears the entire memory and resumes initial values.

PROGRAM RESET resumes the initial program without clearing memory.

There are 2 kind of MASTER RESET.

MASTER RESET 1: Normal MASTER RESET

It clears the entire memory and resumes initial values.

MASTER RESET 2: It enables the layout of fixed keys in addition to MASTER RESET 1.

Fixed keys: [0] [1] [2] [3] [4] [5] [6] [7] [8] [9] [00] [000] [.] [CL] [x] [ST] [TL]

4) Program [0] [1] [2] [3] [4] [5] [6] [7] [8] [9] [00] [000] [.] [CL] [x] [ST] [TL] keys by depressing in this order.

Note: If [000] key is not required, press the same key in the next step, and [000] key will be inhibited.

Procedure B: 1) Unplug the AC cord from the wall outlet.

2) Set the mode switch to the (SRV) position.

3) While holding down the JOURNAL FEED key & the RECEIPT FEED key, plug in the AC cord to the wall outlet.

4) Same as "Procedure A"

Note: Procedure B cannot reset the hardware.

It must be operated "Procedure A" to reset the hardware.

1. MASTER RESET 1

"Procedure A" or "Procedure B"

Procedure A: 1) Set the mode switch to the (SRV) position.

2) Plug in the AC cord to the wall outlet.

3) While holding down the JOURNAL FEED key, turn the mode switch to (SRV) position from (SRV) position.

Procedure B: 1) Unplug the AC cord from the wall outlet.

2) Set the mode switch to the (SRV) position.

3) While holding down the JOURNAL FEED key, plug in the AC cord to the wall outlet.

Note: Procedure B cannot reset the hardware.

It must be operated "Procedure A" to reset the hardware.

2. MASTER RESET 2

"Procedure A" or "Procedure B"

Procedure A: 1) Set the mode switch to the (SRV) position.

2) Plug in the AC cord to the wall outlet.

3) While holding down the JOURNAL FEED key & the RECEIPT FEED key, turn the mode switch to (SRV) position from (SRV) position.

3. PROGRAM RESET

"Procedure A", "Procedure B" or "Procedure C"

Procedure A: 1) Set the mode switch to the (SRV) position.

2) Plug in the AC cord to the wall outlet.

3) Without pressing the JOURNAL FEED key, turn the mode switch to (SRV) position from (SRV) position.

Procedure B: 1) Unplug the AC cord from the wall outlet.

2) Set the mode switch to the (SRV) position.

3) Without pressing the JOURNAL FEED key, plug in the AC cord from the wall outlet.

Procedure C: 1) Unplug the AC cord from the wall outlet.

2) Set the mode switch to the PGM2 position.

3) While holding down the JOURNAL FEED key & the RECEIPT FEED key, plug in the AC cord to the wall outlet.

*"Procedure C" can be done when SRV#916_B_+4: PROGRAM RESET in PGM2 = ENABLE.

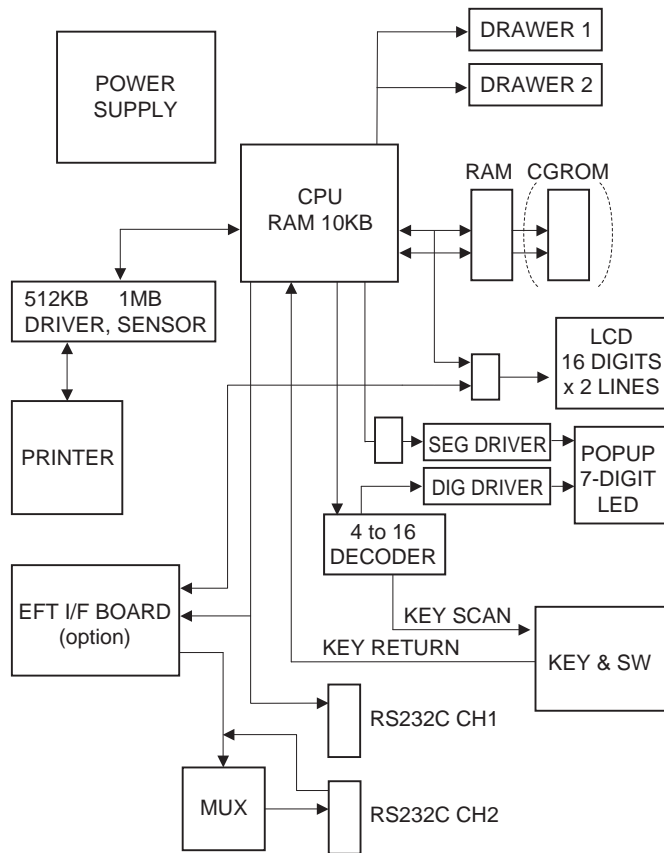
Note: Procedure B and C cannot reset the hardware.

It must be operated "Procedure A" to reset the hardware.

CHAPTER 4. HARDWARE DESCRIPTION

1. BLOCK DIAGRAM

ER-23X



CPU

MITSUBISHI M30620SAFP 12MHz
(INTERNAL RAM 10KB)

EXTERNAL MEMORY

RAM 512KB
FLASH ROM 512KB
SHARP LH28F004BVT
CGROM 1MB (JAPAN ONLY)

PRINTER

PR45MII

2. MEMORY MAP

2-1. ADDRESS MAP

	BANK 0	BANK 1	BANK 2	BANK 3
/CS0	0	0	0	0
BR0	0	1	0	1
BR1	0	0	1	1
00000h				
00400h				
02C00h				
04000h				
08000h				
28000h				
30000h				
40000h				
50000h				
80000h				
C0000h				
FFFFFh				

00000h	Internal RAM area 10KB		
00400h	Internal reserved area		
08000h	External I/O		/CS3
28000h	External SRAM ① 128KB		/CS2
30000h	External SRAM ② 32KB	External SRAM ③ 32KB	/CS1
40000h	External SRAM ④ 64KB		
50000h	External SRAM ⑤ 256KB	CG ROM 512KB (Lower level)	
80000h		CG ROM 512KB (Upper level)	
C0000h	IPL SW OFF: Flash ROM ON: EP RPM	IPL SW OFF: EP ROM ON: Flash RPM	/CS0
FFFFFh	FLASH ROM Lower 256KB	FLASH ROM Lower 256KB	

Even if the bank is changed, the same address can be accessed.

Only the /CS0, /CS1 area (28000h~FFFFFh) in the bank is valid.

2-2. EXTERNAL BUS

EXTERNAL BUS ACCESS SPEED

SRAM/EPROM/FLASH ROM; 2 BCLK

CGROM; 3 BCLK

EXTERNAL I/O; 2 BCLK

*1BCLK = 83.3ns (at 12MHz)

SRAM	/CS2 area address 08000h~27FFFh 128KB /CS1 area BANK 0,2 address 28000h~2FFFFh 32KB x 2 /CS0 area BANK 0 address 30000h~7FFFFh 320KB
FLASH ROM	/CS0 area BANK 0 address 80000h~FFFFFh 258KB (Moves to Bank 1 when rewriting using EPROM.)
CGROM	/CS0 area BANK 2,3 address 40000h~BFFFFh (512KB x 2)
I/O	/CS3 area BANK0 address 04000h~07FFFh 16KB

*CGROM is available only for the Japanese market.

3. CPU PIN TABLE

M16C/24 PORT MEMORY SPACE: NORMAL MODE

PROCESSOR MODE: MICRO PROCESSOR MODE

It is used by (SEPARATE BUS 8bit width).

PORT	PIN No.	I/O	Pin name	Signal name	Initial value	OFF MODE	Function
P00	88	I/O	D0	D0		Out L	
P01	87	I/O	D1	D1		Out L	
P02	86	I/O	D2	D2		Out L	
P03	85	I/O	D3	D3		Out L	
P04	84	I/O	D4	D4		Out L	
P05	83	I/O	D5	D5		Out L	
P06	82	I/O	D6	D6		Out L	
P07	81	I/O	D7	D7		Out L	
P10	80	O	P10	RAS	L	Out L	RECEIPT PAPER FEED A
P11	79	O	P11	RBS	L	Out L	RECEIPT PAPER FEED B
P12	78	O	P12	RCS	L	Out L	RECEIPT PAPER FEED C
P13	77	O	P13	RDS	L	Out L	RECEIPT PAPER FEED D
P14	76	O	P14	JAS	L	Out L	JOURNAL PAPER FEED A
P15	75	O	P15	JBS	L	Out L	JOURNAL PAPER FEED B
P16	74	O	P16	JCS	L	Out L	JOURNAL PAPER FEED C
P17	73	O	P17	JDS	L	Out L	JOURNAL PAPER FEED D
P20	72	O	A0	A0		Out L	
P21	71	O	A1	A1		Out L	
P22	70	O	A2	A2		Out L	
P23	69	O	A3	A3		Out L	
P24	68	O	A4	A4		Out L	
P25	67	O	A5	A5		Out L	
P26	66	O	A6	A6		Out L	
P27	65	O	A7	A7		Out L	
P30	63	O	A8	A8		Out L	
P31	61	O	A9	A9		Out L	
P32	60	O	A10	A10		Out L	
P33	59	O	A11	A11		Out L	
P34	58	O	A12	A12		Out L	
P35	57	O	A13	A13		Out L	
P36	56	O	A14	A14		Out L	
P37	55	O	A15	A15		Out L	
P40	54	O	A16	A16		Out L	
P41	53	O	A17	A17		Out L	
P42	52	O	A18	A18		Out L	
P43	51	O	A19	A19		Out L	
P44	50	O	/CS0	/CS0		Out L	
P45	49	O	/CS1	/CS1		Out H	
P46	48	O	/CS2	/CS2		Out H	
P47	47	O	/CS3	/CS3		Out L	

PORT	PIN No.	I/O	Pin name	Signal name	Initial value	OFF MODE	Function
P50	46	O	/WR	/WR		Out L	
P51	45	O	/BHE	(NU)		Out L	
P52	44	O	/RD	/RD		Out L	
P53	43	O	BCLK	BCLK		Out L	
P54	42	O	/HLDA	(NU)		Out L	
P55	41	I	/HOLD	/HOLD		In	
P56	40	O	ALE	(NU)		Out L	
P57	39	I	/RDY	/RDY		In	
P60	38	O	/RTS0	/RS2	H	In	RS-232 /RS2
P61	37	O	CLK0	DRAWER1	L	Out L	DRAWER 1 DRIVE SIGNAL
P62	36	I	RXD0	RD2		In	RS-232 RD2
P63	35	O	TXD0	SD2	H	In	RS-232 SD2
P64	34	O	/RTS1	/RS1	H	In	RS-232 /RS1
P65	33	O	P65	/EFTRES	H	Out L	EFT RESET SIGNAL
P66	32	I	RXD1	RD1		In	RS-232 RD1
P67	31	O	TXD1	SD1	H	In	RS-232 SD1
P70	30	O	TXD2	SO	L	Out L	PRINTER DATA OUT
P71	29	I	RXD2	SI		In	PRINTER DATA IN
P72	28	O	CLK2	PCLK	L	Out L	PRINTER CLOCK
P73	27	O	P73	DRAWER2	L	Out L	DRAWER 2 DRIVE SIGNAL
P74	26	O	P74	/ER1	H	In	RS-232 /ER1
P75	25	I	P75	/CD1		In	RS-232 /CD1
P76	24	I	P76	/CS1		In	RS-232 /CS1
P77	23	I	P77	/DR1		In	RS-232 /DR1
P80	22	O	P80	BUZZER	L	Out L	
P81	21	O	P81	VHCOM	L	In	PRINTER HEAD CONTROL
P82	20	I	/NIT0	POFF		In	
P83	19	I	P83	/EFTC		In	EFT PWB connect
P84	18	O	P84	/ER2	H	In	RS-232 /ER2
P85	17	I	/NMI	/NMI (NU)		In	
P86	11	O	XCOUT	XCOUT			32.768kHz
P87	10	I	XCIN	XCIN			32.768kHz
P90	7	I	P90	MODE		In	MODE KEY SENSE
P91	6	I	P91	MSENS		In	MISCELLANEOUS SENSE
P92	5	O	P92	BA1	L	Out L	BANK 1 SIGNAL
P93	4	O	P93	BA0	L	Out L	BANK 0 SIGNAL
P94	3	O	P94	DATA/CE	L	Out L	LCD DATA LATCH SIGNAL
P95	2	O	P95	BLON	L	Out L	BACK LIGHT ON

PORT	PIN No.	I/O	Pin name	Signal name	Initial value	OFF MODE	Function
P96	1	O	P96	LCDON	L	Out L	LCD POWER ON
P97	100	I	P97	IPLON		In	IPL ON SIGNAL
P100	97	I	AN0	TM		In	HEAD TEMPERATURE MONITOR
P101	95	I	AN1	VPTEST		In	HEAD VOLTAGE MONITOR
P102	94	I	AN2	VREF		In	REFERENCE VOLTAGE
P103	93	O	AN3	/STRB1	H	In	PRINTERSTORE SIGNAL 1
P104	92	O	AN4	/STRB2	H	In	PRINTERSTORE SIGNAL 2
P105	91	O	P105	/STRB3	H	In	PRINTERSTORE SIGNAL 3
P106	90	O	P106	/STRB4	H	In	PRINTERSTORE SIGNAL 4
P107	89	O	P107	LATCH	L	In	PRINTER LATCH SIGNAL

POWER SUPPLY/CONTROL PINS

PORT	PIN No.	I/O	PIN NAME	FUNCTION
BYTE	8	I	BYTE	Connected to VDD
CNVSS	9	I	CNVSS	Connected to GND
/RESET	12	I	/RESET	
XOUT	13	O	XOUT	OPEN
VSS	14		VSS	Connected to GND
XIN	15	I	XIN	Connected to Spectram
VCC	16		VCC	Connected to VDD
VCC	62		VCC	Connected to VDD
VSS	64		VSS	Connected to GND
AVSS	96		AVSS	Connected to GND
VREF	98		VREF	Connected to VDD
AVCC	99		AVCC	Connected to VDD

4. PRINTER CONTROL

The PR-45M printer is used.

4-1. STEPPING MOTOR CONTROL

The stepping motor is driven at a constant voltage by Sanken STA471A.

1step: 0.125mm, 1dot: 1step

Printing speed: 50mm/s

<CPU's PORT>

No.	CPU PORT	Signal to be used
80	P10	RAS
79	P11	RBS
78	P12	RCS
77	P13	RDS
76	P14	JAS
75	P15	JBS
74	P16	JCS
73	P17	JDS

<DRIVING STEP>

RECEIPT MOTOR

	Driver IC input (CPU output)				Motor drive signal			
STEP	RAS	RBS	RCS	RDS	/RPFA	/RPFB	/RPFC	/RPFD
1	H	L	L	H	L	H	H	L
2	L	H	L	H	H	L	H	L
3	L	H	H	L	H	L	L	H
4	H	L	H	L	L	H	L	H

	Driver IC input (CPU output)				Motor drive signal			
STEP	JAS	JBS	JCS	JDS	/JPFA	/JPFB	/JPFC	/JPFD
1	L	H	H	L	H	L	L	H
2	L	H	L	H	H	L	H	L
3	H	L	L	H	L	H	H	L
4	H	L	H	L	L	H	L	H

*When the motor is at rest, the same phase as the final excitation phase is RUSH energized for 10 ms to turn off all phases.

→ Turn all AS~RDS and JAS~JDS into L.

No energizing should be allowed at least 30 ms after stopping the motor before restarting.

When starting the motor, the first excitation phase is RUSH energized for 10 ms to start the motor by acceleration control.

4-2. HEAD CONTROL

HEAD: 864 dots in all Printable range

RECEIPT side 384 dots

JOURNAL side 384 dots

Related PORT

No.	CPU PORT	Signal to be used
30	TXD2	SO
29	RXD2	SI
28	CLK2	PCLK
93	P103	/STRB1
92	P104	/STRB2
91	P105	/STRB3
90	P106	/STRB4
89	P107	LATCH
21	P81	VHCOM

/STB1: 1~288dot: 288 dots in all

/STB2: 289~432dot: 144 dots in all

/STB3: 433~576dot: 144 dots in all

/STB4: 577~864dot: 288 dots in all

Total 864 dots

*When turning off the printer power supply, make sure to turn /STB1,2,3,4 to "H."

*Do not turn on without paper.

*THERMAL HEAD power supply control: Turn ON when P81 = "H"; turn OFF when at "L." (The power supply for HEAD and STEPPING MOTOR is shared.) When printing is finished, (when the motor is stopped), the power should be turned off.

*Before printing or feeding paper, perform A/D conversion in 10 ms after the printer head is turned on and make sure the voltage is stable.

5. A/D CONVERSION

The following three kinds of signals are inputted to the A/D conversion port of the ER-A410/420.

<CPU's PORT>

No.	CPU PORT	Signal to be used	Function
97	AN0	TM	PRINTER HEAD TEMPERATURE MONITOR
95	AN1	VPTEST	PRINTER HEAD VOLTAGE MONITOR
94	AN2	VREF	REFERENCE VOLTAGE

5-1. PRINTER HEAD TEMPERATURE MONITOR

The voltage divided by the resistor and the thermistor for detecting the temperature of the printer head is inputted to AN0 pin. As shown below, the printer head energizing is controlled.

HEAD TEMPERATURE	A/D CONVERSION VALUE (DEC)	OPERATION
-10°C or below	929~1023	MOTOR LOCK
-10°C ~ 0°C	869~928	PRINT IN ENERGIZING TIME AT 0°C
0°C ~ 70°C	232~868	PRINT IN ENERGIZING TIME SHOWN IN PR-45 CONTROL SPEC
70°C or above	0~231	MOTOR LOCK

5-2. PRINTER HEAD VOLTAGE MONITOR

A voltage is supplied by the printer head power supply, passed through the printer, divided by the resistor, and inputted to AN1 pin. Before reading the A/D conversion value, turn the VHCOM signal (CPU P81) to "H" and make sure the voltage is stable. Then read the A/D conversion value.

The printable voltage range for the printer is 15V~26V. The voltage is calculated from the AN1 value and the A/D conversion value of the reference voltage of AN2.

5-3. REFERENCE VOLTAGE

The reference voltage (2.495V±0.085V) generated by KIA431F is inputted to AN2 pin.

$$469 \text{ (DEC)} \leq VREF \leq 557 \text{ (DEC)}$$

VREF 469 (DEC) corresponds to VREF = 2.41V at VCC = 5.25V

VREF 557 (DEC) corresponds to VREF = 2.58V at VCC = 4.75V

6. KEY/DISPLAY

6-1. LCD CONTROL

The LCD control is the same as that of the ER-A275P.

LCD-related Register

Function	Address	R/W
LCD Write Data	04001h	W
LCD Read Data	04002h	R
LCD Control Signal / Key Strobe Signal	04003h	W
Data Latch Signal	CPU port P94	W

<LCD Control Signal/Key Strobe Signal>

Address	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
04003h	—	E	R/W	RS	KS3	KS2	KS1	KS0

Bit7: Not used

Bit6: E
Enable Signal  Enable

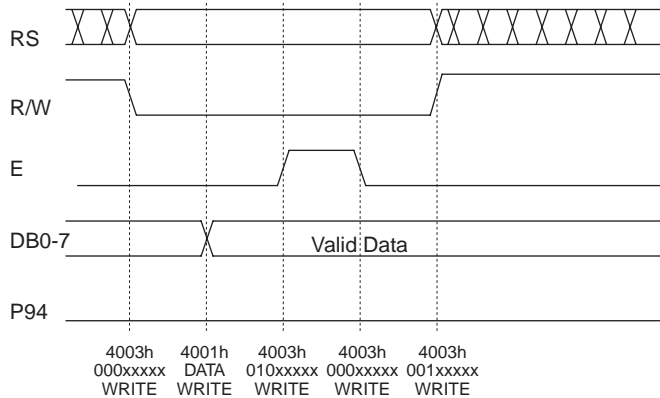
Bit5: R/W
H: Data read L: Data Write

Bit4: RS
H: Data input L: Instruction Input

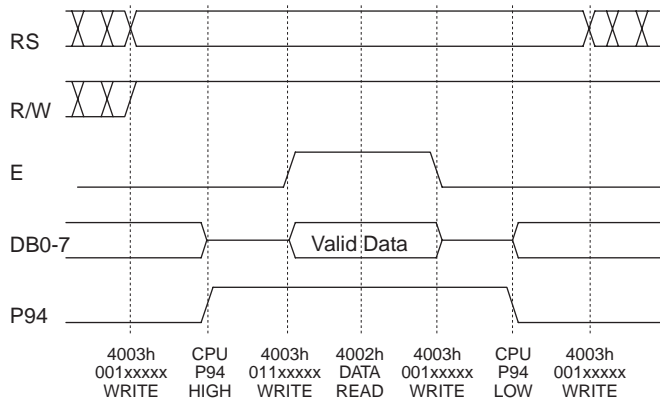
<Data Latch Signal> P94

L: LCD write data latch

DATA WRITE (CPU → LCD)



DATA READ (CPU ← LCD)



6-2. KEY/DISPLAY SCAN

On A410/420, the key and display scan signal is common.

Key/display scan and key read are performed at the following timing.

- ① Key/display scan cycle: 10ms
- ② Blanking time: 50us
- ③ KEY DATA READ timing: 10 ~100us before turning off the strobe signal
KEY DATA are read in two divisions by switching the exchange signal.

Key/Display-related Register

Function	Address	R/W
LED Segment Signal	04000h	W
LCD Control Signal / Key Strobe Signal	04003h	W
Key Return Signal	04003h	R
Key Exchange Signal	04003h Bit7	W
Key Select Signal	CPU port P90	R

<LED Segment Signal> Write

Address	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
04000h	dp	g	f	e	d	c	B	a

<LCD Control Signal/Key Strobe Signal> Write

Address	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
04003h	X	E	R/W	RS	KS3	KS2	KS1	KS0

Bit3~0: KS3~0

At KS3~0, the strobe signals of KEY and POP UP Display are generated.

<Key Return Signal, Key Exchange Signal> Read Flat Keyboard

Address	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
04001h	X	X	X	X	KR11	KR10	KR9	KR8
04003h	KR7	KR6	KR5	KR4	KR3	KR2	KR1	KR0

<Key Return Signal> Read Normal Keyboard

Address	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
04003h	KR7	KR6	KR5	KR4	KR3	KR2	KR1	KR0

<Key Select Signal>

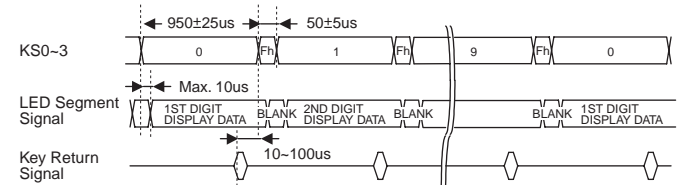
READ is performed at the timing of ST9 of CPU port P90 (Refer to 6-3.)

1: NORMAL KEY

0: FLAT KEY

The flat keyboard switches the key exchange signal and takes key data in two times. For the reading timing, refer to the timing chart below.

The normal keyboard reads key data 10~100us before turning off the strobe signal of the keyboard.



6-3. OTHERS

	CPU	ST0	ST1	ST2	ST3	ST4	ST5	ST6	ST7	ST8	ST9
MODE	P90	SRV	PGM	VOID	OP X/Z	REG	MGR	X1/Z1	X2/Z2		Key Select
OTHERS	P91	PF-R	PF-J	RPE	HEAD UP	JPE		DRAWER OPEN			RS1_CI

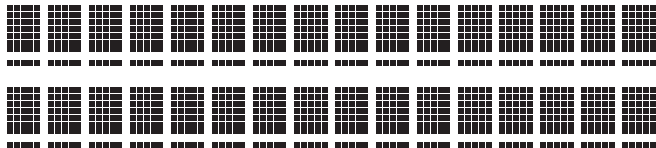
The MODE key switch and other sensor signals are read with the CPU port P90 and 91 at the keyboard strobe timing. Reading is performed 10~100us before turning off the strobe signal.

P90	ST0 :	MODE Key SRV	"0" SRV mode
	ST1 :	MODE Key PGM	"0" PGM mode
	ST2 :	MODE Key VOID	"0" VOID mode
	ST3 :	MODE Key OP X/Z	"0" OP X/Z mode
	ST4 :	MODE Key REG	"0" REG mode
	ST5 :	MODE Key MGR	"0" MGR mode
	ST6 :	MODE Key X1/Z1	"0" X1/Z1 mode
	ST7 :	MODE Key X2/Z2	"0" X2/Z2 mode
	ST9 :	Keyboard select	"0" Flat key "1" Normal key
P91	ST0 :	Receipt feed	"0" Receipt feed
	ST1 :	Journal feed	"0" Journal feed
	ST2 :	Receipt paper end	"1" Receipt paper end
	ST3 :	Head up	"0" Head up
	ST4 :	Journal paper end	"1" Journal paper end
	ST6 :	Drawer open sensor	"0" Drawer open
	ST9 :	RS-232 ch1 CI signal	

6-4. DISPLAY

The ER-A410/A420 is provided with the front LCD of 5 x 7dot, 2 lines 16 digits, and the 7-digit LED on the pop up side.

FRONT:



POP UP:



• DISPLAY DIGIT SIGNAL

The above ST0~ST6 are DIGIT signals.

ST0: 1st digit~ST6:7th digit

• DISPLAY SEGMENT SIGNAL (REFER TO 6-2.)

By writing segment data to 4000h, the LED segment signal can be outputted.

DATA~SEGMENT correspondence

D0~D6 → a~g

D7 → DP

7. EFT I/F

The ER-A410/A420 can be connected with the EFT I/F PWB as an option.

The EFT I/F is mapped in the /CS3 area.

By inserting the EFT PWB, the RS-232 CH2 signal is switched to the signal from the EFT.

Since, however, the reception data (RTX) of RS232 CH2 is inputted to the CPU without being cut, the CPU port must be set so that the input can be received without problems. The EFT PWB unit is common except for the EFT section of the ER-01EF and the I/O address from the HOST.

7-1. EFT I/F

HOST CPU I/O address	Name	
0400EH	DTR (Data register)	Used for data send/receive to/from the EFT I/F CPU. When WRITE: ECR → EFT When READ: EFT → ECR READ/WRITE should be performed only when the condition of NOTE 1 is satisfied.
0400FH	STR (Status register)	Used for data send/receive to/from the EFT I/F CPU. When WRITE: Indicates the EFT I/F status. When READ: EFT sub system reset control

D7	D6	D5	D4	D3	D2	D1	D0
X	X	X	X	X	CLM	IBF	OBF

① ② ③

X: Not fixed (EFT → ECR just before)

① Data read of SUB CPU 1: Not reading 0: Reading

② Data to SUB CPU 1: YES 0: NO

③ Data to HOST CPU 1: YES 0: NO

NOTE 1) Data write to DTR is performed when "CLM:1/IBF:0."

Data read from DTR is performed when "OBF:1."

EFT RESET

Pin No.	CPU PORT	Signal to be used
33	P65	/EFTRST

RESET signal to initialize the EFT I/F.

After resetting the machine, /EFTRST is outputted at LOW for more than 10μsec.

During LOW period, the EFT I/F should not be accessed.

EFT CONNECT SIGNAL

Pin No.	CPU PORT	Signal to be used
19	P83	/EFTC

EFT I/F connect signal 0: EFT PWB provided 1: EFT PWB not provided

7-2. EFT I/F CONNECTOR SPECIFICATIONS

GND	1	2	GND
GND	3	4	GND
A0	5	6	A1
A2	7	8	A3
A4	9	10	A5
VCC	11	12	VCC
/RD	13	14	/WR
/CS3	15	16	
D0	17	18	D1
D2	19	20	D3
D4	21	2	D5
D6	23	24	D7
	25	26	/EFTRES
/EFT_CD	27	28	EFT_RD
EFT_SD	29	30	/EFT_ER
/EFT_DR	31	32	/EFT_RS
/EFT_CS	33	34	/EFT_CI
/POFF	35	36	/EFTS
GND	37	38	GND
GND	39	40	GND

8. SERIAL I/O

The ER-23X is provided with 2ch of RS-232 PORTs as standard provision. 1ch of the two is switched with the EFT I/F.

The RS-232 ch1 and ch2 are assigned to the following CPU port and I/O.

Ch1

Pin No.	CPU PORT	Signal to be used
34	/RTS1	/RS1
32	RXD1	RD1
31	TXD1	SD1
26	P74	/ER1
25	P75	/CD1
24	P76	/CS1
23	P77	/DR1
6	P91 (Refer to 6-3.)	/CI1

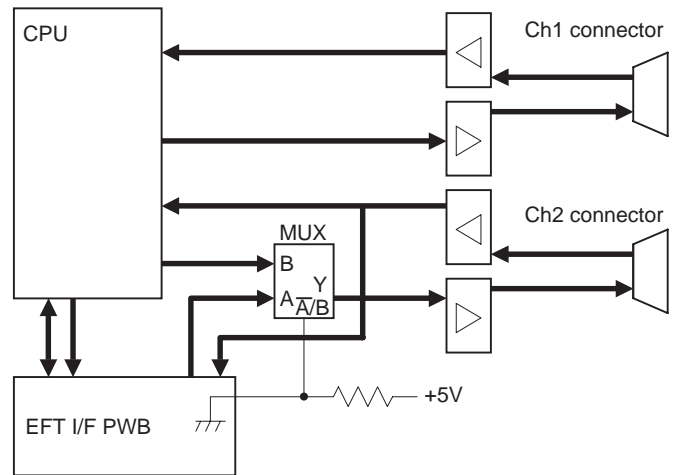
Ch2

Pin No.	CPU PORT	Signal to be used
38	/RTS0	/RS2
36	RXD0	RD2
35	TXD0	SD2
18	P84	/ER2

<Serial I/O ch2 receive signal> Read

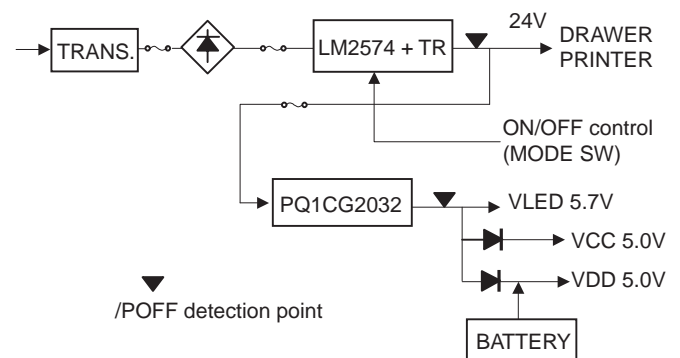
Address	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
04000h	X	X	X	X	/CD2	/DR2	/CS2	/CI2

RS-232/EFT I/F BLOCK DIAGRAM



9. POWER

Service interruption should be performed within 10ms after generation of /POFF.



10. FLASH MEMORY REWRITE PROCEDURE

IPL from EP-ROM: Set the IPL SW to ON and turn on the power, and the EP-ROM will be boosted.

The bank of the EP-ROM program is switched through S-RAM to transfer the program to the FLASH ROM.

IPL from COM: Data from PC is written through the COM port to the FLASH ROM. (Max. 38.4kbps)

11. DRAWER

The ER-A410/A420 is provided with 2CH of DRAWER ports.

The DRAWER solenoid energizing time is as shown below.

50ms (max) 45ms(min)

12. PRINT RATIO LIMITATION

Max. 288dot/1line x 140line (Corresponds to black background LOGO print.)

Ave. 108dot/1line or less (Corresponds to 12.5% of all dots.)

13. BUZZER

A buzzer of piezo type is used.

The oscillation frequency is 4.0kHz \pm 0.5kHz.

14. RESET

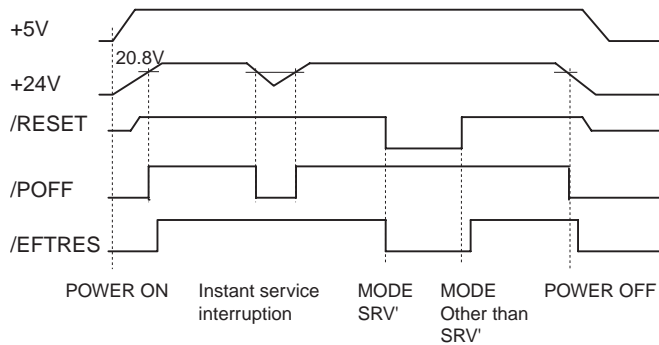
The RESET signal is generated under the following condition.

- 1) When the MODE KEY SWITCH is moved from SRV' to another position (except for OFF).

15. POFF

The POFF signal is changed from 0 to 1 when the 5V system power and the 24V system power reach the operating voltage. When they fall below the operating voltage, the signal is changed from 1 to 0.

POFF, RESET TIMING CHART



16. I/O

<LED Segment Signal> Write

Address	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
04000h	dp	g	f	e	d	c	B	a

<Serial I/O ch2 receive signal> Read

Address	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
04000h	X	X	X	X	/CD2	/DR2	/CS2	/CI2

<LCD Write Data> Write

Address	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
04001h	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0

<Key Return Signal, Key Exchange Signal> Read

Address	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
04001h	X	X	X	X	KR11	KR10	KR9	KR8

<LCD Read Data> Read

Address	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
04002h	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0

<LCD Control Signal/Key Strobe Signal> Write

Address	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
04003h	X	E	R/W	RS	KS3	KS2	KS1	KS0

<Key Return Signal> Read

Address	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
04003h	KR7	KR6	KR5	KR4	KR3	KR2	KR1	KR0

<LCD Control Signal/Key Strobe Signal> Write

Address	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
04003h	X	E	R/W	RS	KS3	KS2	KS1	KS0

<EFT Data> Write/Read

Address	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0400Eh	D7	D6	D5	D4	D3	D2	D1	D0

<EFT Status> Read

Address	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0400Fh	X	X	X	X	X	CLM	IBF	OBF

CHAPTER 5. DIAGNOSTIC PROGRAM

1. TEST ITEMS

The test items are as follows:

	Code	Description
1)	100	Display buzzer test
2)	101	Key code
3)	102	Printer test
4)	104	Keyboard test
5)	105	Mode switch test
6)	106	Printer sensor test
7)	107	Clock test
8)	110	Drawer 1 open & sensor test
9)	111	Drawer 2 open & sensor test
10)	116	LCD CG test
11)	120	External RAM test
12)	121	CPU internal RAM test
13)	130	FLASH ROM test
14)	160	AD conversion port test
15)	500	RS232 ch1 test
16)	501	RS232 ch2 test
17)	510	EFT self test

*Starting DIAG.

Mode switch: SRV

key operation: Above code + "TL" key

2. DESCRIPTION OF EACH DIAG PROGRAM

1) DISPLAY BUZZER TEST

① Key operation

100 → TL

② Test procedure

OP display

D	I	S	P		B	U	Z	Z	E	R		S	R	V	
0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F

Rear display

4.5.6.7.8.9.0.

The decimal point on the LED and the cursor on the LCD will shift from the lower digit to the upper digit in steps of 1 digit (every 200 msec)

After that, all segments will turn on (about 1 sec)

These two modes are repeated.

At the same time, the buzzer sounds continuously.

③ Check that:

A) Each position is correctly displayed.

B) The brightness of each number is uniform.

C) The buzzer sound is normal.

④ End of testing

You can exit the test mode by pressing any key. The following is printed.

1 0 0

2) KEY CODE

① Key operation

101 → TL

② Test procedure

OP display

K	E	Y		C	O	D	E					S	R	V	
○												○	○	○	

KEYBOARD

KEY CODE

③ Check that:

KEYBOARD: 1: Normal type 0: Flat type

KEY code: Every time a key is pressed, the hard code of that key is displayed as a decimal number.

When a key is pressed twice or pressed in an incorrect manner, --- will be displayed.

④ End of testing

You can exit the test mode by turning the mode switch to a position other than the PGM mode. The printer prints as follows:

1 0 1

3) PRINTER TEST

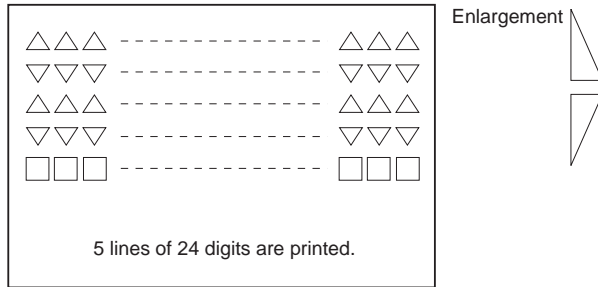
- ① Key operation

102 → TL

- ② Test procedure

OP display

R	/	J		P	R	I	N	T	E	R		S	R	V	



At the receipt side, the logo is also printed and the receipt is issued.

- ③ Check that:

The print is free from contamination, blur, and uneven density.

- ④ End of testing

The test will end automatically.

4) KEYBOARD TEST

- ① Key operation

---104 → TL

↑
KEY check sum code

- ② Test procedure

The keyboard is checked using the sum check code of the key code.

If the sum check code is not entered, the check is made using the sum check code of the default keyboard arrangement

The sum check data for each model is entered to the front 4 digits of the DIAG code, and that data is compared with the key data added until the final key (CA/AT) is pressed.

Both data are the same, the test ends, printing the number given below.

If both data are different, the printer prints the error message.

OP display

K	E	Y		B	O	A	R	D			S	R	V	
1	0	4												

KEY CODE

- ③ Check:

A) The content of completion print

- ④ End of testing

When the test ends normally: **1 0 4**

When an error occurs: E --- **1 0 4**

Note: Calculation of key sum check data

Hard codes (hexadecimal number) at the position (excluding feed key) where there is an input data contact are added.

However, the end key (TL) is not added.

This data to which hard codes have been added is converted into a decimal number value, which will become the sum check data that will be entered when DIAG is started.

5) MODE SWITCH TEST

- ① Key operation

105 → TL

- ② Test procedure

OP display

M	O	D	E		S	W					S	R	V	
1	0	5												X

MODE: SRV_PGM2_PGM1_OFF_OP X/Z_REG_MGR_X1/Z1_X2/Z2__SRV

X : 0 1 2 9 3 4 5 6 7 0

The above X must be read in the correct order. (If the contact is open, 9 will be displayed.)

- ③ Check:

The display during testing and the content of the completion print.

- ④ End of testing

When the test ends normally

1 0 5

When an error occurs:

E --- **1 0 5**

6) PRINTER SENSOR TEST

- ① Key operation

106 → TL

- ② Test procedure

Check the status of the paper end sensor and head up sensor.

OP display

R	/	J		S	E	N	S	O	R		S	R	V	
1	0	6									X	-	Y	

- ③ Check the following.

X: 1 - Paper present at the receipt side

O - No paper at the receipt side

Y: 1 - Paper present at the journal side

O - No paper at the journal side

- ④ End of testing

You can exit the test mode by pressing any key and the printer prints the following.

1 0 6

7) CLOCK TEST

- ① Key operation

107 → TL

- ② Test procedure

OP display

T	I	M	E	R		C	H	E	C	K		S	R	V	
1	0	7				*	*	-	*	*		*	*		

Hour Min. Sec.

Blinks at an interval of 0.5 sec.

- ③ Check that:

"-" blinks and the clock counts up.

④ End of testing

When any key is pressed, the date and time are printed and the test mode will be terminated.

X X X X X - X X X X X 107
 year month day hour min. sec.

8) DRAWER 1 OPEN & SENSOR TEST

① Key operation

110 →

② Test procedure

OP display

D	R	A	W	E	R	1				S	R	V	
													X

X : O = DRAWER OPENED

C = DRAWER CLOSED

③ Check that:

- A) The drawer 1 opens normally.
- B) The sensor correctly indicates the status of the drawer 1.

④ End of testing

You can exit the test mode by pressing any key. The printer prints the following.

1 1 0

9) DRAWER 2 OPEN & SENSOR TEST

① Key operation

111 →

② Test procedure

OP display

D	R	A	W	E	R	2				S	R	V	
													X

X : O = DRAWER OPENED

C = DRAWER CLOSED

③ Check that:

- A) The drawer 2 opens normally.
- B) The sensor correctly indicates the status of the drawer 2.

④ End of testing

You can exit the test mode by pressing any key. The printer prints the following.

1 1 1

10) LCD CG TEST

① Key operation

116 →

② Test procedure

To check the display CG, 256 pieces of built-in CG's are grouped into 16 blocks and each 16 characters is displayed on the dot display.

At first, CG code of 00H ~ 0FH is displayed. By pressing any key, each block is displayed in sequence.

OP display

X	Y											S	R	V	
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

"O" indicates the CG display position.

"XY" indicates the code at the head of each block in hexadecimal number.

(Example: 10, A0)

③ Check that:

- A) Displays are clear.
- B) Free from blur, chip-off, unevenness.

④ End of testing

You can exit the test mode by pressing any key. The printer prints the following.

1 1 6

11) EXTERNAL RAM TEST

① Key operation

120 →

② Test procedure

The standard 256 Kbyte RAM is checked.

The contents of memory must be stored before and after this test.

RAM (08000H~7FFFFH area and 28000H~2FFFFH area) is tested in the following procedure:

- a) Store data in the test areas
- b) Write "00H"
- c) Read and compare "00H" and then write "55H"
- d) Read and compare "55H" and then write "AAH"
- e) Read and compare "AAH"
- f) Restore stored data

If an error occurs at a step, the error is printed.

If any error does not occur, the following addresses are checked in turns.

Addresses to be checked:

08000H, 08001H, 08002H, 08004H, 08008H, 08010H, 08020H, 08040H, 08080H, 08100H, 08200H, 08400H, 08800H, 09000H, 0A000H, 0C000H, 10000H, 18000H, 28000H (BANK 0), 28000H (BANK 3), 30000H, 40000H

OP display

R	A	M								S	R	V	
1	2	0											

③ Check:

- A) The completion print.

④ End of testing

The program ends after printing as follows:

When the test ends normally: 120

When the test end abnormally: Ex - ~ - 120

x = 1: Data error

x = 2: Address error

When an error occurs, the printer outputs the error message and the address where the error has occurred in the area *****.

12) CPU INTERNAL RAM TEST

① Key operation

121 → TL

② Test procedure

The test program tests internal RAM (10 Kbytes) of the CPU.
The contents of memory must be stored before and after this test.
RAM (00400H ~ 02BFFH area) is tested in the following procedure.

- Store data in the test area.
- Write "00H"
- Read and compare "00H" and then write "55H"
- Read and compare "55H" and then write "AAH"
- Read and compare "AAH"
- Restore stored data

If an error occurs at a step, the error is printed.

If any error does not occur, the following addresses are checked in turns.

Addresses to be checked:

01000H, 01001H, 01002H, 01004H, 01008H
01010H, 01020H, 01040H, 01080H,
01100H, 01200H, 01400H, 01800H,
02000H

OP display

C	P	U		R	A	M						S	R	V	
1	2	1													

③ Check:

The completion print.

④ End of testing

The test program ends after printing.

When the test ends normally: 121

When the test ends abnormally: Ex -- -- 121

x = 1: Data error

x = 2: Address error

If an error occurs, the printer outputs the error message and the address where the error has occurred in the area *****.

13) FLASH ROM TEST

① Key operation

130 → TL

② Test procedure

The test program checks that the checksum of the flash ROM (BANK0F80000H ~ FFFFFFFH).

The lower two digits of the checksum should be 10H. (pending)

OP display

F	L	A	S	H		R	O	M				S	R	V	
1	3	0													

③ Check:

The completion print.

④ End of testing

The test will automatically be terminated and the printer prints as follows:

When the test ends normally: 130

ROM ***** (Model name)
***** (Version)

When the test ends abnormally: E -- -- 130

ROM ***** (Model name)
***** (Version)

14) AD CONVERSION PORT TEST

① Key operation

160 → TL

② Test procedure

The test program displays the voltage of each AD conversion port.

Display

OP display	T	M								=	*	*	*	*	S	R	V	
Repeat	1	6	0															
OP display	V	R	F							=	*	*	*	*	S	R	V	
	1	6	0															
OP display	V	P	T	E	S	T	=	*	*	*	*	S	R	V				
	1	6	0															

③ End of testing

You can exit the test mode by pressing any key. The printer prints the following.

1 6 0

15) RS232 CH1 TEST

Install the RS232 loopback connector.

① Key operation

500 → TL

② Test procedure

The test program checks the control signals.

OUTPUT			INPUT		
/ER1	/RS1	/DR1	/CI1	/CD1	/CS1
OFF	OFF	OFF	OFF	OFF	OFF
OFF	ON	OFF	OFF	ON	ON
ON	OFF	ON	ON	OFF	OFF
ON	ON	ON	ON	ON	ON

Data communication check

A loopback test of 256-byte data between is performed.

DATA: \$00 - \$FF BAUD RATE:9600 BPS

OP display

R	S	2	3	2		T	E	S	T		S	R	V	
5	0	0												

③ Check:

The completion print.

④ End of testing

Completion print

RS TEST

OK

Error print

RS TEST

NGERxx

xx Contents of error

01 ER DR error

02 ER CI error

03 RS CD error

04 RS CD error

05 SD RD error

DATA error

06 SD RD error

DATA error/framing error

16) RA232 CH2 TEST

Install the RS232 loopback connector.

① Key operation

501 →

② Test procedure

The test program checks the control signals.

OUTPUT		INPUT			
/ER2	/RS2	/DR2	/CI2	/CD2	/CS2
OFF	OFF	OFF	OFF	OFF	OFF
OFF	ON	OFF	OFF	ON	ON
ON	OFF	ON	ON	OFF	OFF
ON	ON	ON	ON	ON	ON

Data communication check

A loopback test of 256-byte data between is performed.

DATA: \$00 - \$FF BAUD RATE: 9600 BPS

OP display

R	S	2	3	2		T	E	S	T		S	R	V		
5	0	1													

③ Check:

The completion print.

④ End of testing

Completion print	RS TEST	OK
Error print	RS TEST	**NG**ERxx
xx	Contents of error	
01	ER DR error	
02	ER CI error	
03	RS CD error	
04	RS CD error	
05	SD RD error	DATA error
06	SD RD error	DATA error/framing error

17) EFT SELF TEST

Turn off the power, and set all DIP switches of the ER-03EF to OFF. Connect the loop back connector to the RS232 CH2 port.

Set the mode SW to the SRV position, and turn ON the power.

① Key operation

510 →

OP display

R	S	2	3	2		T	E	S	T		S	R	V		
5	0	1													

After the above key operation, the EFT self test is automatically executed.

② Test procedure

- The loop back test of ER-DR, ER-C1, and RS-CS are performed for the EFT connector.
- In DIP SW1 check, each of SW1 ~ 8 is turned on one by one.
- If normal, the sum check of the EFT ROM is performed and the write/read check of the RAM is performed.

③ JOURNAL print (Normal end)

```
ER03EF TEST
ER03EF DIPSW
  DIAG0(SELF TEST) :OK
ER03EF ROM
  VHI27040RBF1*   :OK
ER03EF RAM
  256K SRAM       :OK
```

JOURNAL print (Abnormal end)

```
ER03EF TEST
  ER-DR LOOP ERROR
  ER-CI LOOP ERROR
  RS-CD LOOP ERROR
  RS-CS LOOP ERROR
  RDRF ERROR
  SD-RD STATUS ERROR
ER03EF DIPSW
  DIP SW ERROR
ER03EF ROM
  VHI27040R**** :ERROR
ER03EF RAM
  256K SRAM     :ERROR
```

3. KEY CODE TABLE

ER-A410V

		051	131	115		067	147	148		003	004
↑	↑	052	132	116		084	068	146	018	002	005
RF	JF	050	130	114		082	066	149	145	017	001
033	037	053	133	117		085	069	065	064	016	000
032	048	128	129	113		081	080	086	070	006	
038	054	118	112			102	103	087	071	007	
039	055										

CHECK SUM : 4 2 6 7

ER-A420V

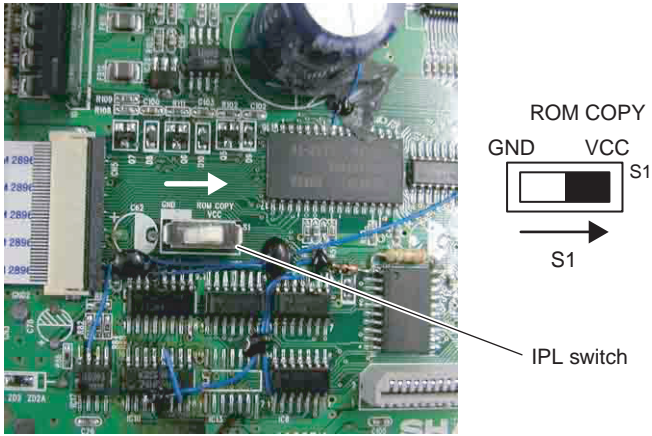
↑	↑	032	048	055	039	033	049	065	035	067	099	133	120	121	138	155
RF	JF	128	112	096	103	113	097	115	051	084	100	102	101	117	089	105
064	119	135	130	129	131	116	132	118	134	085	104	136	073	122	090	123
080	087	082	066	081	083	068	086	150	070	069	072	088	153	154	074	139
144	071	146	050	145	147	148	054	038	053	149	152	056	057	058	075	091
016	151	034	017	001	019	052	036	022	021	037	040	025	041	042	059	027
000	007	023	018	002	003	020	004	006	005	024	008	009	010	026	043	011

CHECK SUM : 8 9 4 0

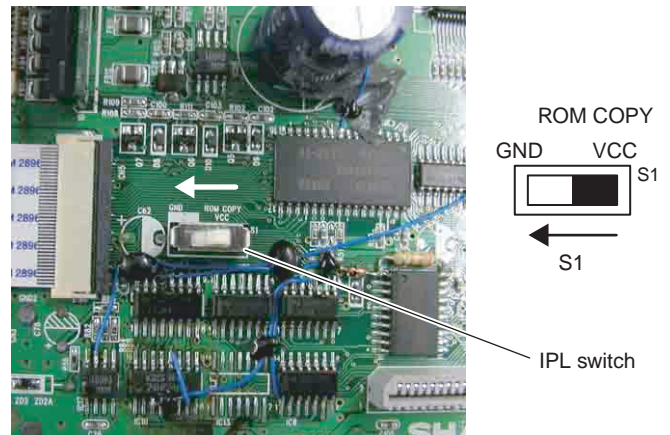
CHAPTER 6. IPL FROM EP-ROM

Before working on the installation, unplug the AC code from the AC outlet.

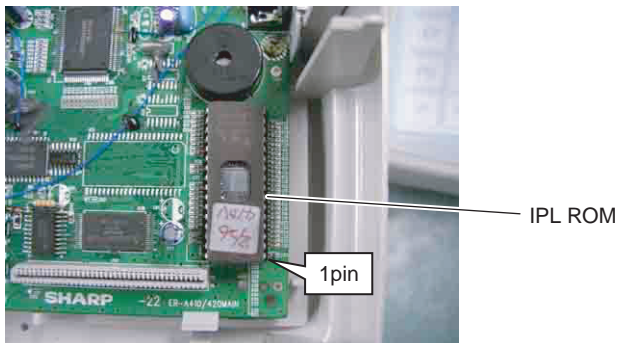
1. Open the top cabinet.
2. Set the IPL switch (S1) to ROM COPY position.



6. Unplug the AC code from the AC outlet.
7. Remove the IPL ROM to the IC socket of the MAIN PWB.
8. Set the IPL switch (S1) to GND position.



3. Install the IPL ROM to the IC socket of the MAIN PWB.



9. Replace the top cabinet.
10. Perform the master reset.

Turn the mode key switch to the SRV' position, insert AC plug in AC outlet.

While holding down Journal feed key, turn to SRV position from SRV' position.

4. Turn the mode key switch to SRV' position, and insert AC plug in AC outlet.
5. Turn the mode key switch to SRV position. The IPL procedure is started.

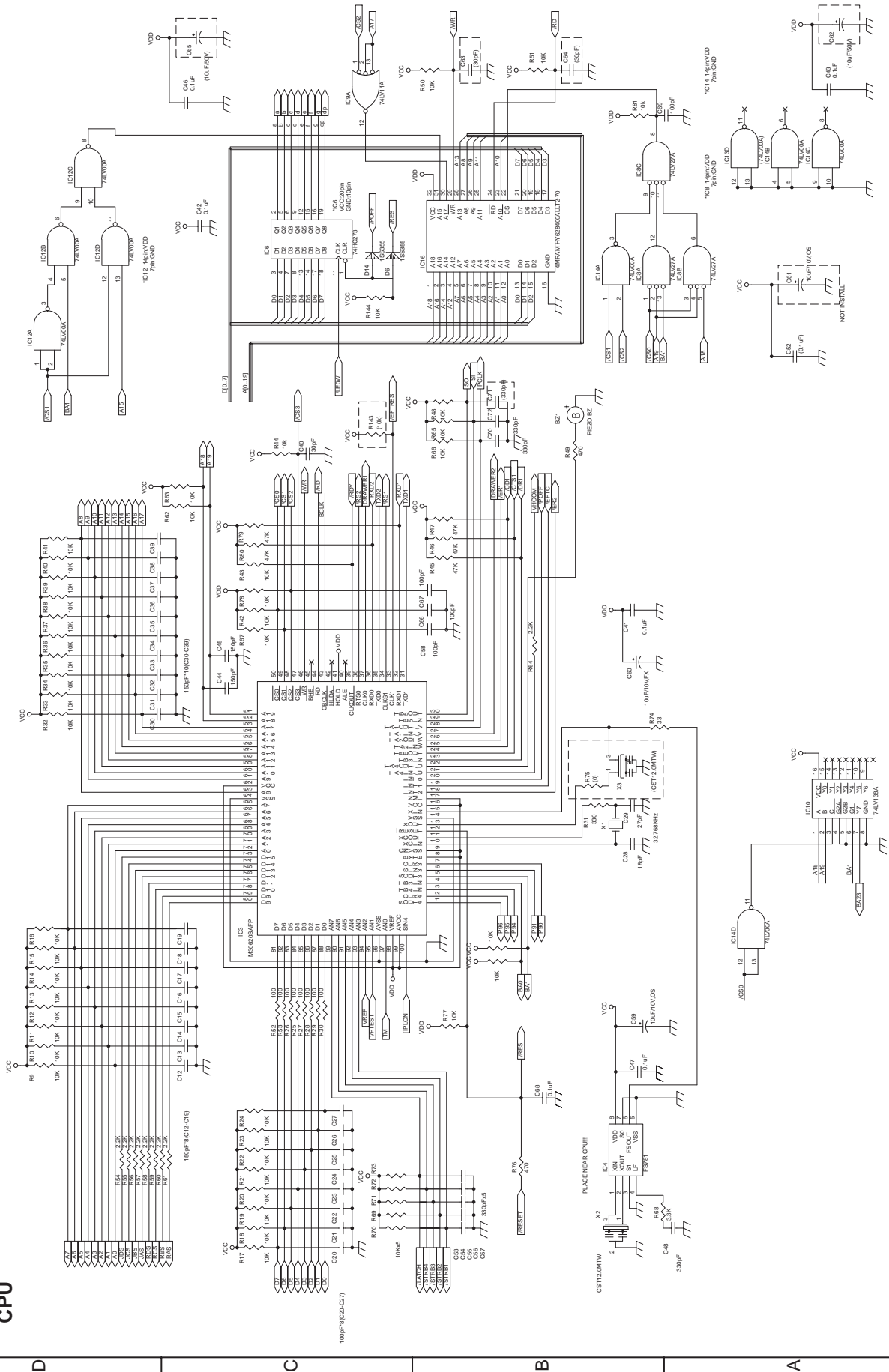
When the procedure is completed, the message of "Completed." Is shown.

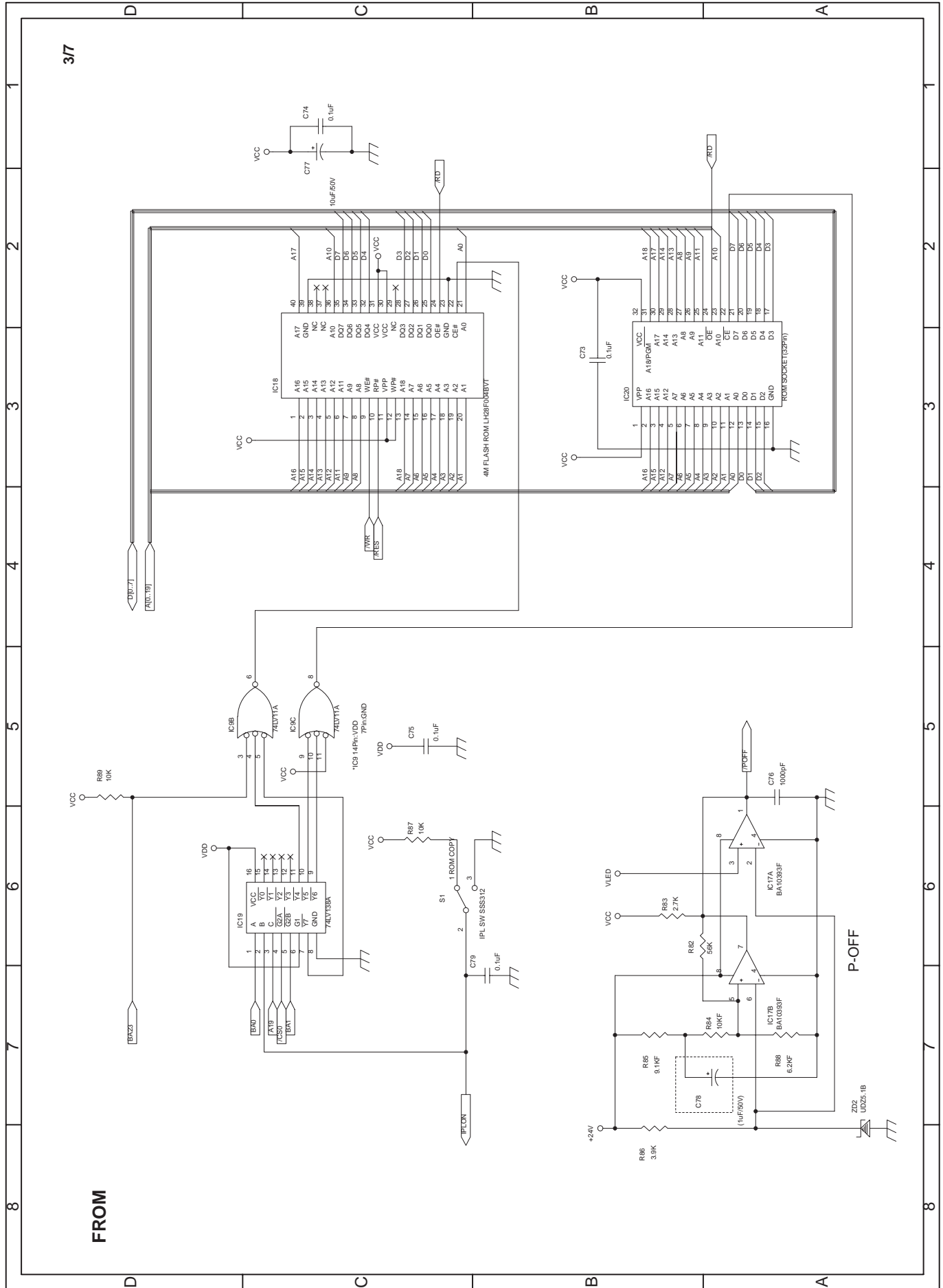


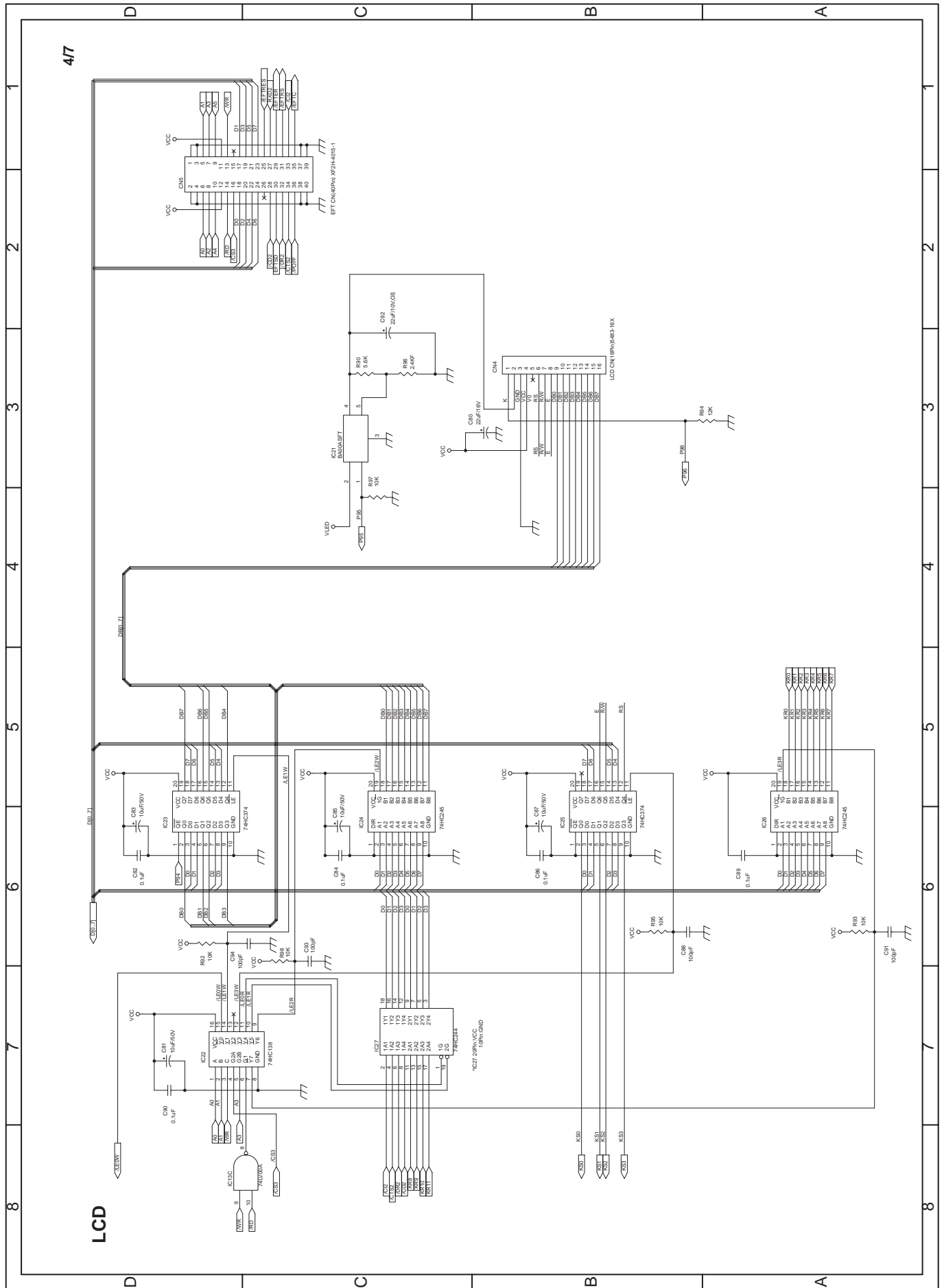
CHAPTER 7. CIRCUIT DIAGRAM AND PWB LAYOUT

MAIN PWB CPU

1/7

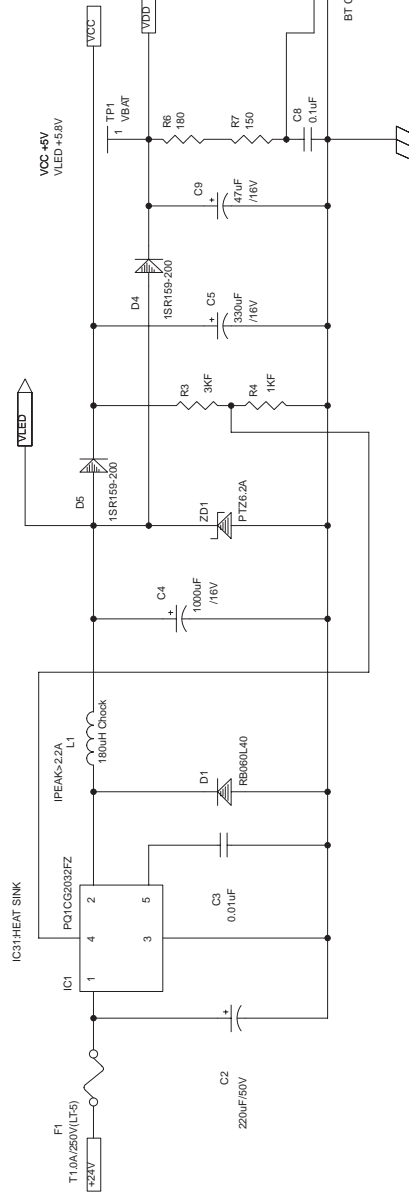
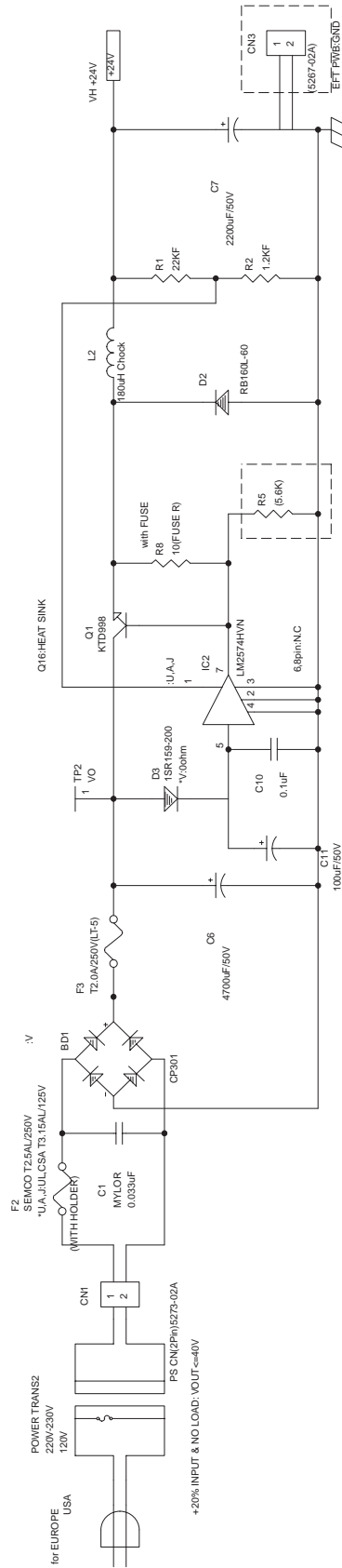




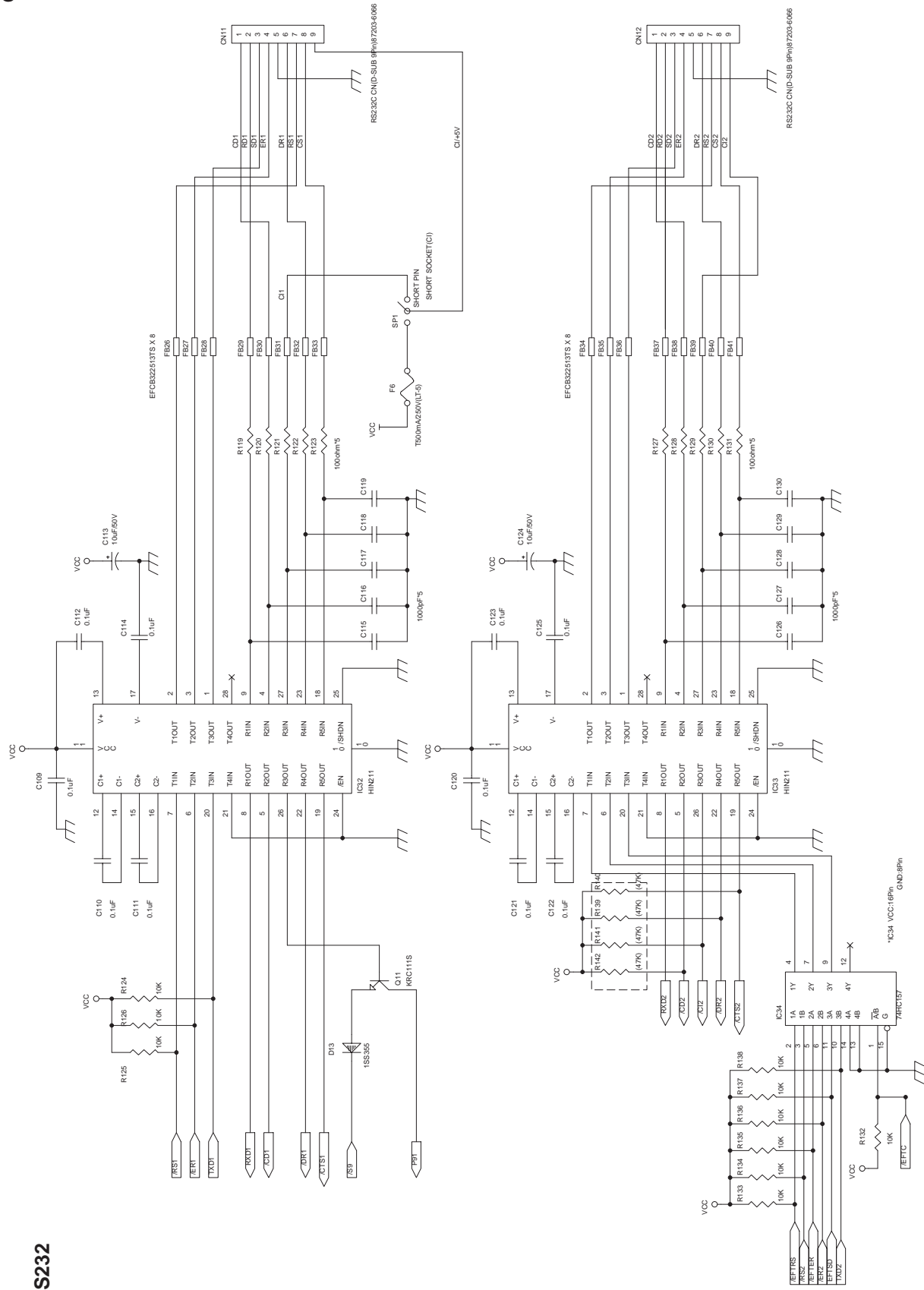


POWER

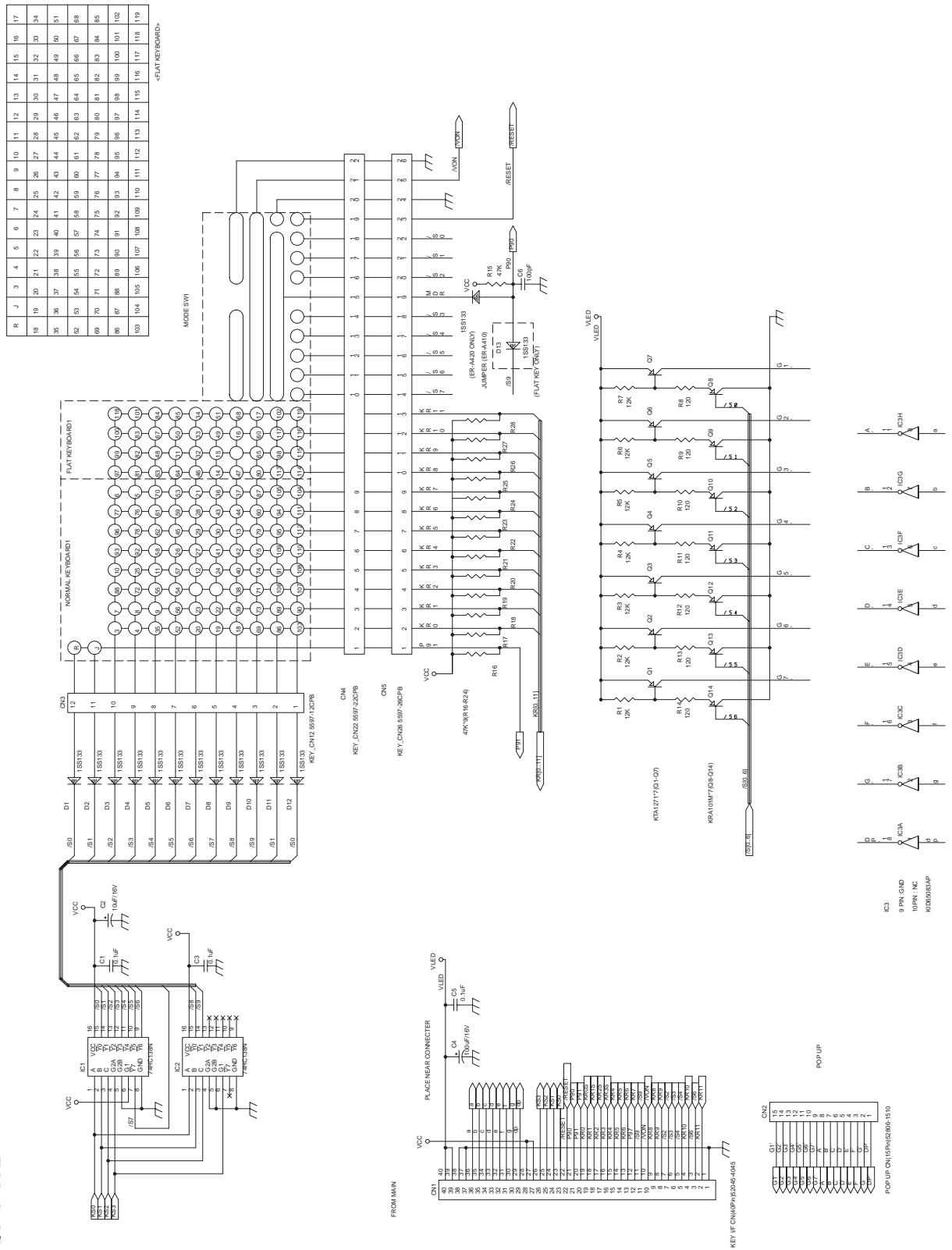
5/7



RS232

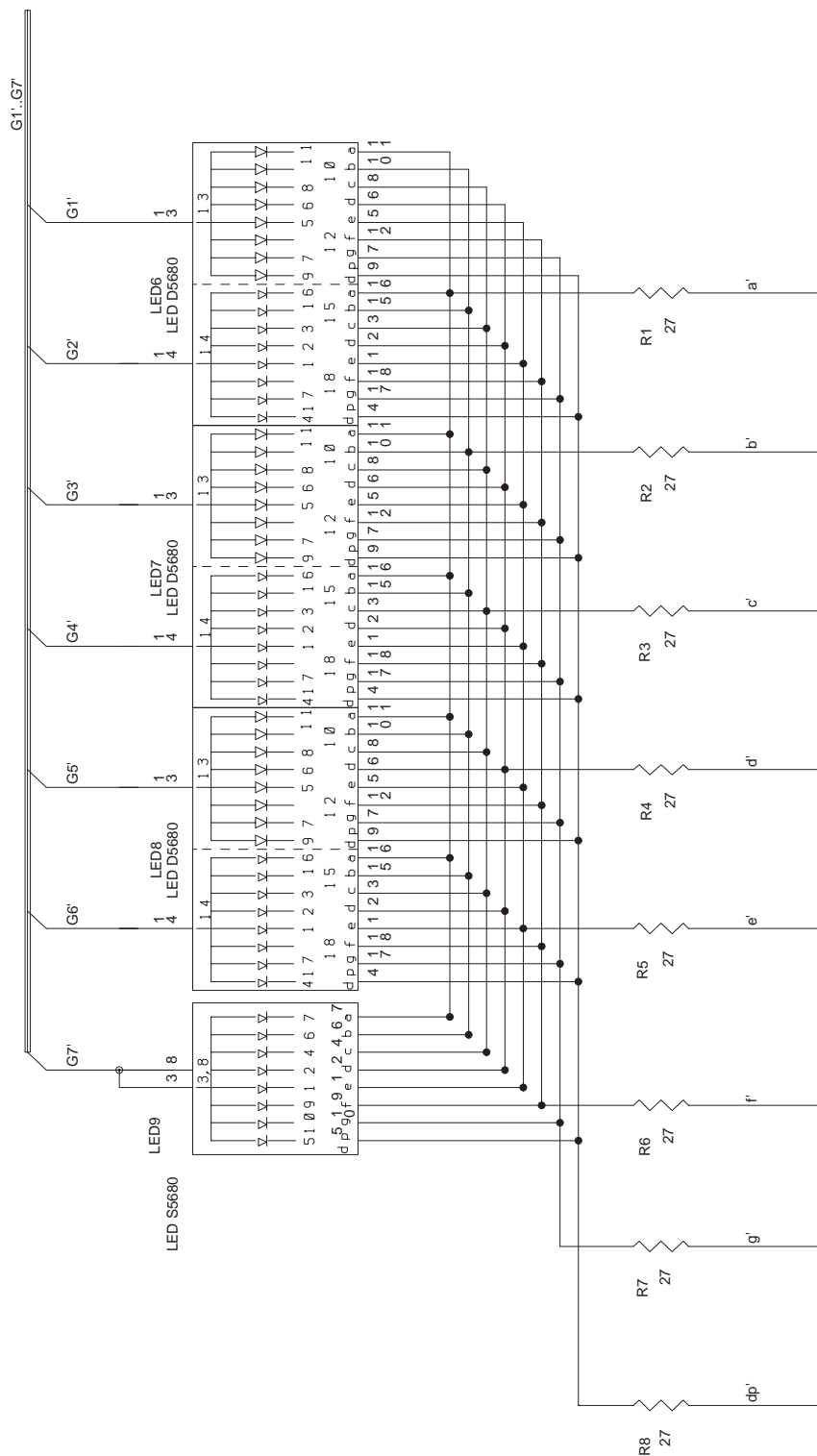






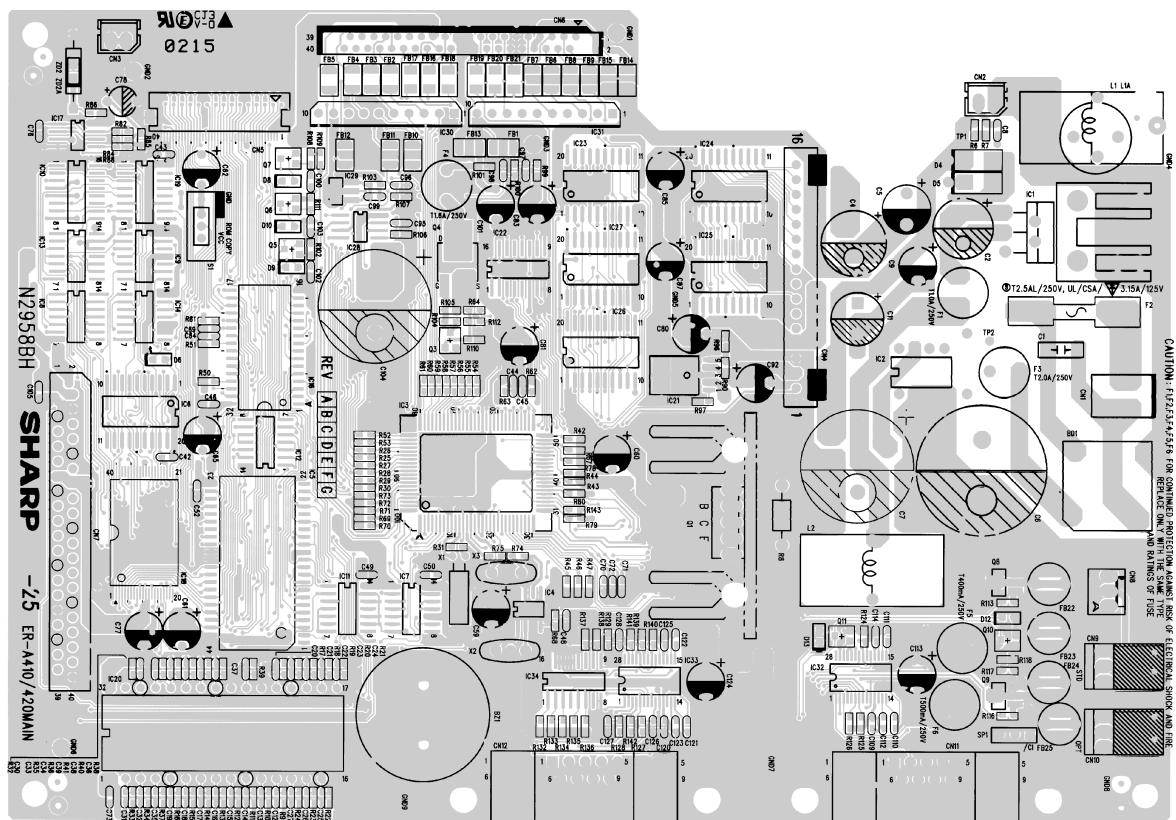
POP UP PWB

1/1

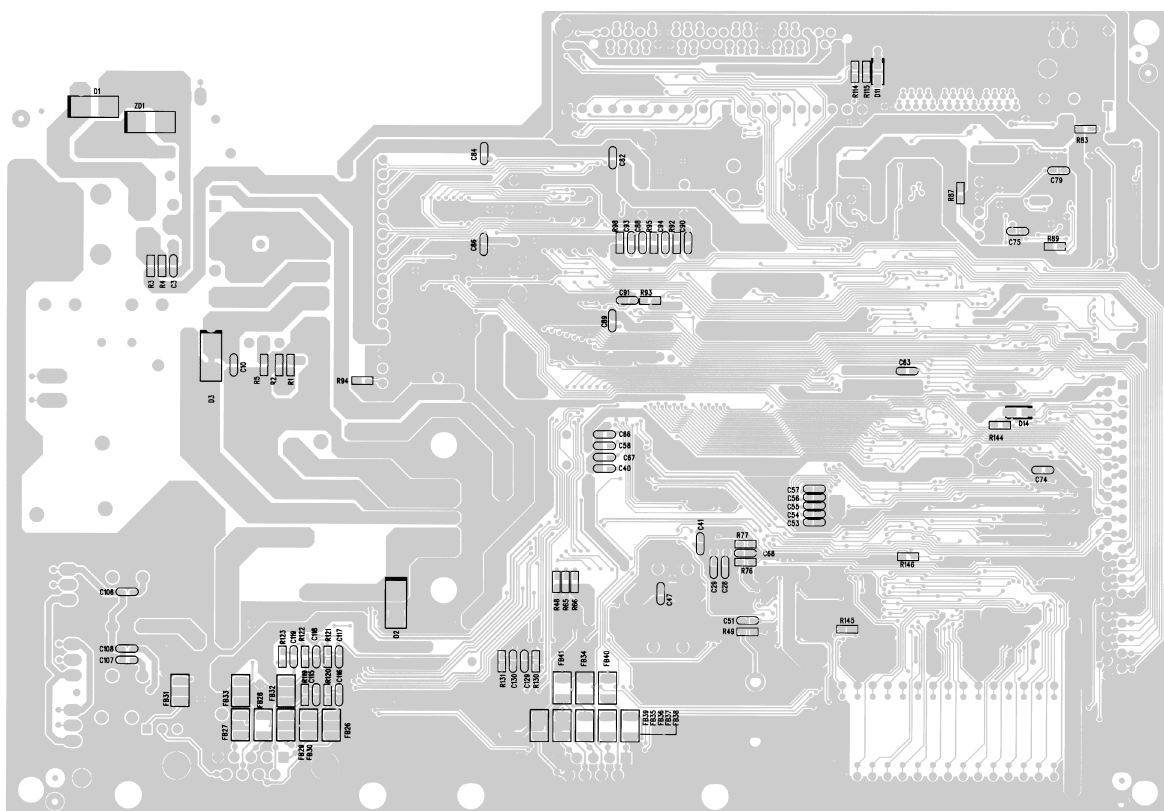


PWB LAYOUT

MAIN PWB
TOP



BOTTOM



SHARP

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SHARP CORPORATION
Digital Document Systems Group
Products Quality Assurance Department
Yamatokoriyama, Nara 639-1186, Japan
2002 May Printed in Japan ⓘ